Activity Title: HOW WET IS OUR PLANET? Activity Guide Page #: 8

Objective(s): Students will: 1) describe the amount and distribution of water on the earth in oceans, rivers, lakes, groundwater, icecaps and the atmosphere; and 2) make inferences about the importance of responsible use of water.

Method/Overview: Students calculate water volumes using percentages.

Subject Area(s): Math, Science Grade Level(s): 4-12

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to ensure high alignment for every student**
Mathematics B. Computation Students will understand and demonstrate computation skills.	Middle Grades 5-8 1. Compute and model all four operations with whole numbers, fractions, decimals, sets of numbers, and percents, applying the proper order of operations.	<u>Procedure #2</u> Calculate the estimated amounts of fresh water. <u>Procedure #5</u> Have the students assume that five gallons represents all the water on the Earth. <u>Procedure #7</u> Remove water represented by all freshwater lakes and rivers. <u>Procedure #8</u> Summarize the activity by using an earth globe to show that less than ½ cup would fill all the oceans, rivers lakes and ice caps. <u>Extension #3</u> Calculate the size of a model of the earth that will accommodate all the water in the aquarium used in the demonstration. <u>Evaluation #1</u> Estimate the percentage of water that is distributed in each of the following areas of our planet: oceans, rivers, freshwater lakes, inland seas and saltwater lakes, groundwater, icecaps and glaciers and the atmosphere.	• have each student show calculations • have each student show estimations in journals • have each student show calculations in journals
	Secondary Grades 1. Use various techniques to approximate solutions, determine the reasonableness of answers, and justify the results.	<u>Procedures #2, #5, #7 and #8, Extension #3 and Evaluation #1</u>	• same as listed above

Activity Title: PUDDLE WONDERS Activity Guide Page #: 22

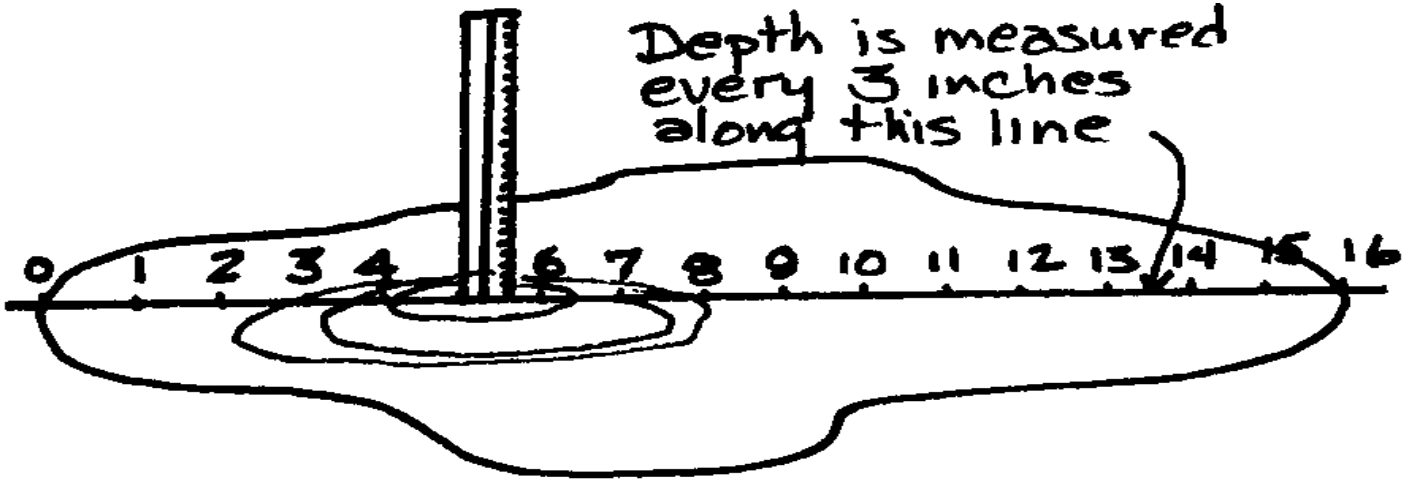
Objective(s): For younger students, Students will: 1) predict where puddles will form and how they will change: and 2) observe and describe organisms that live in or near puddles. For older students, Students will: predict where puddles will form and how they will change; 2) observe and describe organisms that live in or near puddles; 3) measure and record the amount of water in puddles: and 4) make inferences about what types of organisms occupy puddles.

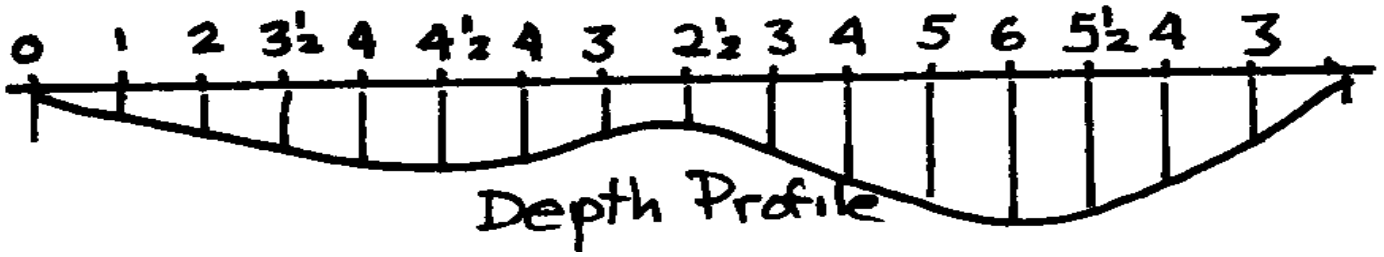
Method/Overview: Students will: observe water that accumulates in puddles on or near the school grounds as well as any associated wildlife. Older students also measure the depth, area, and volume of the puddle.

Subject Area(s): Science, Math, (for older students) Grade Level(s): 2-12

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to ensure high alignment for every student**
Mathematics F. Measurement Students will understand and demonstrate measurement skills.	Elementary Grades 3-4 1. Solve and justify solutions to real-life problems involving the measurement of time, length, area, perimeter, weight, temperature, mass, capacity, and volume.	Procedure #2 Have each team of students prepare a map of the school showing locations of predicted puddles. Procedure #3 This time the students should locate actual position of puddles on their maps. They should find the area of one or more puddles. The team should also determine volume of puddles. Extension #1 Keep a record, ask the students to calculate how much water is caught each year by the puddle they studied. Extension #2 & #3 Find relatively permanent puddles and carry out some observations. Do a depth profile. Evaluation #2 How would you determine the amount of water in a puddle, explain your answer.	• use measurement to make maps • have students show calculations in journals • students should record these observations in their journals
	Elementary Grades 3-4 2. Select measuring tools and units of measurement that are appropriate for what is being measured.	Procedures #2 and #3, Extensions #1-#3, and Evaluation #2	• same as listed above
	Middle Grades 5-8 3. Demonstrate an understanding of length, area, volume, and the corresponding units, square units, and cubic units of measure.	Procedures #2 and #3, Extensions #1-#3, and Evaluation #2	• same as listed above

	Secondary Grades 1. Use measurement tools and units appropriately and recognize limitations in the precision of the measurement tools.	Procedures #2 and #3, Extensions #1-#3, and Evaluation #2	• same as listed above





Activity Title: WHALE OF A TAIL — Activity Guide Page #: 26

Objective(s): Students will: describe the sizes of different great whales compared to their own body size.

Method/Overview: Students use computational, graphing and measuring techniques to draw or sculpture life size replicas of whales on their school grounds.

Subject Area(s): Science, Math, Language Arts — Grade Level(s): 2-8

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to ensure high alignment for every student**
Mathematics B. Computation Students will understand and demonstrate computation skills.	Middle Grades 5-8 2. Create, solve, and justify the solution for multi-step, real-life problems including those with ratio and proportion.	Procedure #3 Learn how to use grids to draw the whale to scale . . . Procedure #4, #6 First make a drawing of their whale on one inch grid paper. Transfer to larger paper. Extension #1 Draw the actual size outline of an African elephant or a brachiosaurus among the whales. Extension #4 See if the whole school can stand inside the whale. Extension #5 Make a life-size whale out of heavy duty plastic. Evaluation Draw a continuum of pictures from smallest to largest. Show the differences in the size according to scale.	• have all students practice transferring designs • have all students help with drawings • have all students make predictions about whether whole school can stand inside whale • have each student show continuum in their journals

Activity Title: WHERE DOES WATER RUN OFF AFTER SCHOOL? Activity Guide Page #: 82

Objective(s): Students will: describe relationships between precipitation, runoff and aquatic habitats.

Method/Overview: Students measure and calculate the area of the school ground; calculate the volume and weight of water falling on the school ground; determine specific and annual rainfall and runoff; and trace the course of that water to aquatic habitats.

Subject Area(s): Math, Science Grade Level(s): 6-12

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Mathematics F. Measurement Students will understand and demonstrate measurement skills. Middle Grades 5-8	Middle Grades 5-8 3. Demonstrate an understanding of length, area, volume, and the corresponding units, square units, and cubic units of measure.	Procedure #1 Students will find out how much rain falls on their school ground and how much it weighs. . . Procedure #2 Determine the amount of rain that falls in the area. Procedure #3 Calculate the volume of the rainfall. Procedure #4 Calculate the weight of the rain.	• make sure each student understands and does the calculations
	Secondary Grades 1. Use measurement tools and units appropriately and recognize limitations in the precision of the measurement tools.	Procedures #1-#4	• make sure each student understands and does the calculations

This rubric focuses on the content addressed in the math, measurement, middle grades, #3 performance indicator.

4	Students exceed the standard if they address the components below *and* include discussion of the implications of their calculations. For example, a) what are some of the positive and negative effects that the water may have on the environment? or b) With what kinds of potential pollutants does the water come in contact?
3	Students meet the standard if they demonstrate the use of length, area, and volume and their corresponding units of measure in conveying how much rain falls on their school and how much the rain weighs. Students must show how they arrive at the volume and its weight.
2	Students partially address the standard if they calculate how much rain falls on their schools grounds and show their work.
1	Students do not meet the standard if they can not complete the calculation of how much rain falls on their school grounds.

Activity Title: MIGRATION HEADACHE — Activity Guide Page #: 94

Objective(s): Students will: 1) list limiting factors affecting population of migrating water birds; 2) predict the effects of such limiting factors; 3) describe the effects of habitat loss and degradation on populations of migrating water birds; and 4) make inferences about the importance of suitable habitat for migrating water birds.

Method/Overview: Students role play migrating water birds traveling between nesting habitats and wintering grounds and are subject to hazards at either end of the migration path as well as along the way.

Subject Area(s): Science, Language Arts, Math, Science, Social Studies, Physical Education — Grade Level(s): 4-12

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Mathematics C. Data Analysis and Statistics Students will understand and apply concepts of data analysis.	Middle Grades 5-8 3. Construct inferences and convincing arguments based on data.	Procedure #6 The series of migration cycles can be graphed as shown below.	• this seems to be a teacher made graph; students should respond in journals to interpret the graph in their own words
	Secondary Grades 2. Predict and draw conclusions from charts, tables, and graphs that summarize data from practical situations.	Procedure #6	• see above
	Elementary Grades 3-4 1. Make generalizations and draw conclusions using various types of graphs, charts, and tables.	Procedure #6	• see above
	Elementary Grades 3-4 2. Read and interpret displays of data.	Procedure #6	• see above

Activity Title: NET GAIN, NET EFFECT — Activity Guide Page #: 104

Objective(s): Students will: 1) describe the evolution of fishing from the techniques of early humans to contemporary times: and 2) interpret the possible effects of changes in technology on fish populations.

Method/Overview: Students conduct a simulation to explore the evolution of fishing and the effects of changing technology on fish populations.

Subject Area(s): Science, Math — Grade Level(s): 3-6

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Mathematics B. Computation Students will understand and demonstrate computation skills.	Elementary Grades 3-4 1. Solve multi-step, real-life problems using the four operations with whole numbers.	Procedure #1 Divide the beans equally among the four containers.	• have students all try different strategies for dividing beans
	Middle Grades 5-8 1. Compute and model all four operations with whole numbers, fractions, decimals, sets of numbers, and percents, applying the proper order of operations.	Procedure #1 Divide the beans equally among the four containers.	• have students all try different strategies for dividing beans
Mathematics C. Data Analysis and Statistics Students will understand and apply concepts of data analysis.	Middle Grades 5-8 3. Construct inferences and convincing arguments based on data.	Procedure #13 OPTIONAL: Work with the students to construct a bar graph to show them the numbers of fish they conduct using the different nets and different techniques of netting.	• have students respond in their journals about which techniques is better
	Elementary Grades 3-4 1. Make generalizations and draw conclusions using various types of graphs, charts, and tables.	Procedure #13 OPTIONAL: Work with the students to construct a bar graph to show them the numbers of fish they conduct using the different nets and different techniques of netting.	• have students respond in their journals about which techniques is better

Activity Title: WHERE HAVE ALL THE SALMON GONE? Activity Guide Page #: 110

Objective(s): Students will: 1) interpret and make inferences about fluctuations in fish populations from actual data; and 2) analyze the effects of human use and habitat changes on a fish population.

Method/Overview: Students graph and interpret actual fish population data in relation to historical events.

Subject Area(s): Science, Math Grade Level(s): 6-12

Standard	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Mathematics C. Data Analysis and Statistics Students will understand and apply concepts of data analysis.	Middle Grades 5-8 2. Assemble data and use matrices to formulate and solve problems.	Procedure #1 Provide students with the fish catch data and information about each fish species only. Have them graph levels of each species caught from 1870 to the present.	• each student should complete the graph
	Middle Grades 5-8 3. Construct inferences and convincing arguments based on data.	Procedure #2 Ask the students to list and explain whatever inferences they can draw from the data provided. Evaluation Study the graph to answer the questions.	• each student should record their own inferences • each should answer questions about graph
	Secondary Grades 2. Predict and draw conclusions from charts, tables, and graphs that summarize data from practical situations.	Procedure #2 and Evaluation	• Each student should complete graph and answer questions about graph

Activity Title: WATERSHED — Activity Guide Page #: 172

Objective(s): Students will: 1) describe the characteristics of watersheds; 2) discuss the role of watersheds in providing wildlife habitat as well as human habitats; and 3) give examples of how watersheds can be conserved and protected.

Method/Overview: Students measure the area of a small watershed, calculate the amount of water it receives each year, and discuss the varied roles the watershed plays in human and wildlife habitat.

Subject Area(s): Science, Math, Social Studies — Grade Level(s): 4-12

Standards	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Mathematics F. Measurement Students will understand and demonstrate measurement skills.	Elementary Grades 3-4 1. Solve and justify solutions to real-life problems involving the measurement of time, length, area, perimeter, weight, temperature, mass, capacity, and volume.	Procedure #4 Drive the stakes or markers along the upper boundary of their watershed. The ridge stakes 20-40 feet apart. Procedure #5 As a group, have the students determine the location of the control stake at the bottom of the watershed . . . Procedure #6 Once this is done, begin the measurements that will result in a map of the watershed.	• Let each student have an opportunity to measure and record in their journals
	Elementary Grades 3-4 2. Select measuring tools and units of measurement that are appropriate for what is being measured.	Procedures #4-#6	• let each student have an opportunity to measure and record in their journals
	Middle Grades 5-8 3. Demonstrate an understanding of length, area, volume, and the corresponding units, square units, and cubic units of measure.	Procedures #4-#6 Procedure #7 Have each team determine the area of the watershed. Procedure #8 Calculate the amount of precipitation that falls on the miniature watershed each year. Extension #1 Calculate the total area using county and state maps. Extension #2 Calculate the total water that falls annually on your watershed. Extension #3 Determine the number of people in your watershed and see how much of the total water is used each year. Extension #6 Calculate the amount of rain in gallons of rain that falls on your school ground each year.	• let each student have an opportunity to measure and record in their journals

	Secondary Grades 1. Use measurement tools and units appropriately and recognize limitations in the precision of the measurement tools.	Procedures #4-#6 Procedures #7 and #8, Extensions #1-#3, #6	• let each student have an opportunity to measure and record in their journals
Mathematics B. Computation Students will understand and demonstrate computation skills.	Elementary Grades 3-4 1. Solve multi-step, real-life problems using the four operations with whole numbers.	Procedures #4 and #5 Extension #3	• see above
	Middle Grades 5-8 2. Create, solve, and justify the solution for multi-step, real-life problems including those with ratio and proportion.	Procedure #6 Each small team should draw a map of this miniature watershed. Ask the students to record their results to scale on a large pad, use about 1/4 or 1/8 inch on the map for each foot on the ground.	• see above

Activity Title: ALICE IN WATERLAND Activity Guide Page #: 182

Objective(s): Students will: 1) trace their domestic water to its source prior to human use and to its destination after use; 2) identify potential effects from human water use on terrestrial and aquatic wildlife; and 3) develop and practice responsible water conservation behaviors.

Method/Overview: Students use a simulated field trip, lecture-discussion and student-gathered data to explore water use and its effects on wildlife habitat.

Subject Area(s): Science, Math Grade Level(s): 5-12

Standards	**Performance Indicators (by grade clusters)**	**Evidence of alignment (text from activity description)**	**Notes to assure high alignment for every student**
Mathematics C. Data Analysis and Statistics Students will understand and apply concepts of data analysis.	Middle Grades 5-8 3. Construct inferences and convincing arguments based on data.	Procedure #7 Now shift the emphasis to the amount of water that people typically use. . . Procedure #8 Ask the students to keep track of how much water is used in their homes for five days. . . Procedure #9 After the water use data has been gathered, make a chart that summarizes the total use in the classmember's home for the entire week. . . Extension #1 Water use conservation saves money. Even if you have your own water . . . drawing, storing, heating and disposing of water have economic costs. . . Extension #2 Monitor water use in your school. Evaluation #2 Estimate the number of gallons of water you use each day for personal use. Evaluation #4 Order the following water uses according to those which use the most water to those which use the least in the United States: domestic, industrial, agricultural/irrigation, recreational.	• record inferences in individual student journals
	Secondary Grades 2. Predict and draw conclusions from charts, tables, and graphs that summarize data from practical situations.	Procedures #7-#8, Extensions #1 and #2, and Evaluations #2 and #4	• Record predictions and conclusions in individual student journals